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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/885,871	06/20/2001	Masahiro Ooshima	9281-4138	3201

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EXAMINER

WATKO, JULIE ANNE

ART UNIT	PAPER NUMBER
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2652

DATE MAILED: 07/18/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/885,871

Applicant(s)

OOSHIMA ET AL. *TD*

Examiner

Julie Anne Watko

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☒ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/814,531.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 03/23/2001 (JP 2000-086261). It is noted, however, that applicant has not filed a certified copy of this Japanese application as required by 35 U.S.C. 119(b).
2. Receipt is acknowledged of papers (JP 2000-085287) submitted under 35 U.S.C. 119(a)-(d) in parent application SN 09814531, which papers have been placed of record in the parent file.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation “the free magnetic layers” in lines 13-14. Only one “free magnetic layer” has been recited (see line 8).

Claim 11 recites the limitation “the non-magnetic intermediate layer” in the last 2 lines. It is unclear whether this limitation refers to the “non-magnetic intermediate layer” of claim 11, lines 4-5, or to the “non-magnetic intermediate layer” of claim 1, lines 16-17.

All other claims are rejected as indefinite by virtue of their dependency from indefinite claims.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-3, 5, 9-10 and 18-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Carey et al (US Pat. No. 6266218 B1).

It is noted by the Examiner that Carey et al uses reference numeral 92 to refer to both a bias layer (see Fig. 9) and a conductive layer (see Fig. 6). The Examiner apologizes for any confusion which may result from this ambiguity of Carey et al.

As recited in claim 1, Carey et al show a spin-valve type thin film magnetic element (see Fig. 9, for example) comprising: a laminate comprising an antiferromagnetic layer 74, a pinned magnetic layer 76 in contact with an antiferromagnetic layer in which the magnetization direction of the pinned magnetic layer is fixed by an exchange anisotropic magnetic field with the antiferromagnetic layer, and a non-magnetic conductive layer 80 formed between the pinned magnetic layer and a free magnetic layer 78; bias layers (92 in Fig. 9) for aligning the magnetization direction of the free magnetic layer in the direction substantially perpendicular to the magnetization direction of the pinned magnetic layer (see arrows in Fig. 9); ferromagnetic layers 90 formed in contact with the bias layers; and conductive layers ("electrical contacts", see col. 7, line 28) for applying a sensing current to the free magnetic layer, wherein each of the ferromagnetic layers is divided into two sub-layers separated by a non-magnetic intermediate

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layer, the sub-layers being in a ferrimagnetic state in which the magnetization direction of one sub-layer is 180 degrees different from the magnetization direction of the other sub-layer (see antiparallel arrows of 84 and 86 in Fig. 9).

As recited in claim 2, Carey et al show that ferromagnetic layers 90 are disposed on the free magnetic layer with a distance corresponding to a track width (see Fig. 9), the bias layers being provided on the ferromagnetic layers ("AF layer 92 can At (*sic*) also be deposited on top of structure 90", see col. 9, lines 49-51) and the conductive layers being provided on the bias layers ("Electrical contacts 92 are typically made to top bias layer", see col. 7, lines 28-29).

As recited in claim 3, Carey et al show that the bias layers (92 in Fig. 9; see also col. 9, line 49, "AD layer 92") are provided at both sides in the track width direction of the laminate, the ferromagnetic layers 90 being provided on the bias layers, and the conductive layers being provided on the ferromagnetic layers 90 ("Electrical contacts 92 are typically made to top bias layer 84 on both sides of sensor 70", see col. 7, lines 28-29; although the electrical contacts are not explicitly shown in Fig. 9, their location on the ferromagnetic layers 90 is made apparent by 92 in Fig. 6).

As recited in claim 5, Carey et al show that the ferromagnetic layer comprises at least one element selected from the group consisting of Ni, Fe and Co ("Co, Fe, Ni or their alloys", see col. 5, line 43).

As recited in claim 9, Carey et al show that the bias layers 92 comprise an antiferromagnetic material ("AF layer 92", see col. 11, line 33).

As recited in claim 10, Carey et al show that the antiferromagnetic material 92 has a lower heat treatment temperature ("AF layer 92 is made of a low blocking temperature material

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with blocking temperature T1, and AF layer 74 is made of high blocking temperature material”, see col. 11, lines 33-35) than that of the antiferromagnetic layer 74.

As recited in claim 18, Carey et al show that the ferromagnetic layer 90 comprises a first ferromagnetic layer 86 and a second ferromagnetic layer 84 which are separated by a non-magnetic intermediate layer 88, the first ferromagnetic layer and the second ferromagnetic layer are in a ferrimagnetic state in which the magnetization direction of the first ferromagnetic layer is 180 degrees different from the magnetization direction of the second ferromagnetic layer (see arrows in Fig. 9), at least one of the first ferromagnetic layer and the second ferromagnetic layer comprise a CoFeNi alloy (“Co, Fe, Ni or their alloys”, see col. 5, line 43), and the non-magnetic intermediate layer 88 (see col. 7, lines 25-26, “non-magnetic exchange coupling layer 88”, which performs the same function in the same way as exchange coupling layer 16 in Fig. 2A) comprises Ru (“Suitable material choices include Ru”, see col. 5, lines 24-37, especially line 32).

As recited in claim 19, Carey et al show that both the first ferromagnetic layer 86 and the second ferromagnetic layer 84 (wherein 86 and 84 perform the same function in the same way as 12 and 14) comprise the CoFeNi alloy (“top and bottom bias layer 12, 14 are made of a magnetic material such as Co, Fe, Ni or their alloys”, see col. 5, line 41).

7. Claims 1, 4-7 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Mack et al (US Pat. No. 6462919 B1).

As recited in claim 1, Mack et al show a spin-valve type thin film magnetic element (see Fig. 6, for example) comprising: a laminate comprising an antiferromagnetic layer 238, a pinned magnetic layer 236 in contact with an antiferromagnetic layer in which the magnetization direction of the pinned magnetic layer is fixed by an exchange anisotropic magnetic field with

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the antiferromagnetic layer, and a non-magnetic conductive layer 234 formed between the pinned magnetic layer and a free magnetic layer 232; bias layers 222A-B for aligning the magnetization direction of the free magnetic layer in the direction substantially perpendicular to the magnetization direction of the pinned magnetic layer; ferromagnetic layers (including 224A-B, 226A-B and 228A-B) formed in contact with the bias layers; and conductive layers (302A-B, for example) for applying a sensing current to the free magnetic layer, wherein each of the ferromagnetic layers is divided into two sub-layers (224A-B, and 228 A-B) separated by a non-magnetic intermediate layer 226A-B, the sub-layers being in a ferrimagnetic state ("synthetic antiferromagnet (SAF)", see col. 8, lines 41-42, for example) in which the magnetization direction of one sub-layer is 180 degrees different from the magnetization direction of the other sub-layer.

As recited in claim 4, Mack et al show that at least one of the pinned magnetic layer ("Pinned layer 226 may also be a SAF structure", see col. 9, line 10) and free magnetic layer is divided into two sub-layers separated by the non-magnetic intermediate layer, the divided sub-layers being in a ferrimagnetic state in which the magnetization direction of one sub-layer is 180 degrees different from the magnetization direction of the other sub-layer.

As recited in claim 5, Mack et al show that the ferromagnetic layer (including 224A-B) comprises at least one element selected from the group consisting of Ni, Fe and Co ("CoFe layers 224", see col. 9, line 5).

As recited in claim 6, Mack et al show that the bias layers comprise an alloy containing Mn and at least one element selected from the group consisting of Pt, Pd, Rh, Fe, Ru, Ir, Os, Au, Ag, Cr, Ni, Ne, Ar, Xe and Kr (see table in col. 8).

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As recited in claim 7, Mack et al show that the bias layers comprise at least one material selected from the group consisting of NiO, α -Fe₂O₃ and CoO (emphasis added; see table in col. 8).

As recited in claim 9, Mack et al show that the bias layers comprise an antiferromagnetic material (222A-B).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al (US Pat. No. 6462919).

As recited in claim 8, Mack et al are silent regarding which AFM materials are used for AFM layer 238; however, Mack et al explicitly disclose AFM materials including those claimed (see teachings above regarding bias layers in claim 6).

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11. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the claimed materials, including PtMn for the AFM layer of Mack et al. The rationale is as follows: one of ordinary skill in the art would have been motivated to use the claimed materials, including PtMn, for the AFM layer in order to prevent corrosion and to resist field reversal as taught by Mack et al (see col. 8, line 2).

Allowable Subject Matter

12. Claims 11-17 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

13. Reasons for indicating allowable subject matter will be stated after all indefiniteness rejections have been overcome.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julie Anne Watko whose telephone number is (703) 305-7742. The examiner can normally be reached on Mon-Thurs 7:30-5 and alternate Fri 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (703) 305-9687. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9315 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.

Julie Anne Watko
Examiner
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JAW
July 14, 2003

A handwritten signature in black ink, appearing to read 'Julie Anne Watko', is written over the printed name and title.